SALES ENGINEER, for closed-loop control systems using digital computers, by new company. Best of incentives. Philadelphia area. Also interested in reps. **Write Box 2386 c/o Instrumentation Technology.**

Sales Position in Systems and Instrumentation with Industrial — Utility Experience beneficial. Established Representative located in the South. Write box 2387, c/o Instrumentation Technology.

ENGINEERING EDITOR

Cover the full technical spectrum of instrumentation and automatic control with ISA. InTech editorial position open for an engineer with journalistic aptitude. Instrumentation experience helpful, editorial experience not required. Send resume and salary requirements marked "Confidential," to:

Frank M. Ryan
Editor & Assoc. Publisher
INSTRUMENTATION TECHNOLOGY
530 William Penn Place
Pittsburgh, Pa. 15219

An Equal Opportunity Employer

POSITIONS WANTED

INSTRUMENT SUPERVISOR
Eight years supervision — seven years as mechanic. Two year electrical certificate — I.C.S. Instrumentation, I.C.S. Electronics, I.C.S. E.E. Reply Box #2389, Instrumentation Technology.

Indian instrumentman, age-34, single. Eighteen years experience in calibration and maintenance of precision process control instruments in oil refinery, fertilizer plant; familiar with Honeywell, Foxboro, Fisher, and Taylor Instruments. Seeks employment. Need emigration visa. Write Box No. 2388, c/o Instrumentation Technology.

NAMEPLATES, DECALS, TAGS, SIGNS and LABELS. TO ALL MIL-SPEC. Free Samples. RUSH Service. SETON CORP., Dept. ISA, New Haven, Conn. 06505

NEED DETECTORS TO MONITOR TOXIC-COMBUSTIBLE GASES-VAPORS IN AIR? WRITE DEVCO, FAIRFIELD, N.J. 07006 FOR QUOTATIONS.

ADVERTISE IN

INSTRUMENTATION TECHNOLOGY

FOR COMPLETE INDUSTRY COVERAGE

Index to Instrumentation Technology, Volume 16, 1969

Articles

	Page
January	
Fluidic Step Programmer Reads Punched Cards	39
Application Pointers for Infrared Thermometry	43
Improving Fail-Safe Design of Process Control Loops	46
System Timing for On-Line Computer—Part II	51
Ada-Predictive Control for a Batch Reaction	57
Monitoring Burner TV Cameras	63
Differential Pressure Range Conversion	63
Extending Pressure Gage Life	64
Level Sensor for Liquid Helium	64
February	
Engineering Instruments for Safety	41
Computer System for a Phosphate Plant	47
Noise Limitations in Signal Detectors	51
Nonlinear Design Improves Analog 3-Mode Controller	54
Guidelines for Using Positioners and Boosters—Part II	58
Transducer Demonstrator	62
Protecting Diffusion Pumps	63
Slip-Ring Check Circuit	63
March	
Carbon Analyzers for Contaminants in Water	33
Metering Pulsating Flow in Orifice Installations	41
The Art of Measuring Thermal Conductivity	45
The Use and Misuse of Pressure Regulators	52
Concentric Miniature Thermocouple	57
Do-it-yourself Electronic Counter	57
April	
Fortran for Process Control (Essay)	40
Sound Ways to Measure Temperature	47
Rotameter Calibration Nomograph for Gases	53
Computer Runs Amine Plant and Reduces Analyzer Data	56
Designing Long-line Pneumatic Control Systems	61
Improving IC Op Amps	67
Feedforward Dryer Control	67
Glossary for Liquid Metering	68
May	
IC Logic Tames Wulff Process	37
En Route to Effective Instrument Maintenance	42
Addressing Methods for a Process Control Computer	46
Switching Process Samples	51
Summer-Fall Short Course Roundup for Instrument Engineers, Technicians	55
June	
TV/Laser System Gages Steel Slab Thickness	43
Control Schemes for Binary Distillation	48
A Dual-energy Absorptometer	52
Estimating Plant Profits for Process Computer Control	56
Modular Fluidic Systems for a Reciprocating Compressor	62
Metering Condensible Gases	67
Limiting Millivolt Signals	67
Vapor Controls Surface Temperature	68
Tunnel Diode Aids Timing	68
July	
Instrumentation Aboard LM	32
Dynamic Response Tests of a Supercritical Power Plant	41
Blast-furnace Computer Ups Profits and Smooths Operation	46
Hydrogen/Density Analyzer Monitors Process Streams	52
Maintaining Sequence Circuits	56
Pipeline Override Controls	56
August	
What's Wrong with the Biomedical Instruments Market	41
Developing Process Control Strategies—Part I	45
Maintaining Test Systems for Digital Data Acquisition	50
Curing Hardware and Software Headaches	55
Low-cost Pneumatic Tubing Bundles	62
Multi-directional Switch Actuation	63
Strain Gage Circuit Roundup	63
September	
A Standard Control Language—How and When? (Essay)	32
The Basics of Ion-selective Electrodes	41
Process Chromatography Tips	46
Monitoring SO_2 in Stacks	52
Mobile Plant Chromatograph Improves Product Recovery	56
Multi-phase Sampling System	59
Treating Liquid GC Samples	60
Delivering Clean, Dry Gas Samples	60
October	
Computer Interface Hardware for Process Control Systems	66
Local Optimizing Control for Distillation	75
Developing Process Control Strategies—Part II	81
Sensing Reliability in Operating Equipment	85
Multistep Valve Design Reduces Throttling Noise	92
Magnetostrictive Torque Transducer	95
Level Probe Works Despite Fouling	100
Gamma Rays Align Coke Ovens	100
High Performance Rotary Switch	101
Crystal Senses Dewpoint Temperature	101
November	
Vibration Measurements Primer	39
Integral Calibrators for Thermocouples	43
Panel Inspection at the Shop	48
Portable Simulator Trains Power Plant Operators	53
Tailoring Chromatographs to a Monitoring Computer	57
Emergency Thermocouple Fittings	63
Calibrating Tiny Flowrates	64
Laser Extends Spectrometric Analysis	64
December	
Digital Transducers—Types and Trends	41
Organizing In-plant Instrument Services	47
Vocal Alarm Systems	52
Sequential Logic Simulation for Industrial Computer Control	54
A Texas-size Story	60
Measuring Noise Exposure	66
Dewpoint Sensor Protects Computer	66

Authors

Authors	Issue, Page
InTech Staff Report	Dec 60
Adams, P. G.	Jan 57
Anderson, G. R.	July 41
Baumann, H. D.	Oct 92
Baxley, Jr., R. A.	Oct 75
Braun, S.	Aug 63
Brockmeier, N. F.	Aug 45, Oct 81
Buckley, P. S.	Apr 61
Buntzel, H.	May 37
Carlo-Stella, G. R.	Dec 54
Chan, A. L.	June 48
Clark, E. B.	Oct 100
Combs, J. F.	Sept 60
Corwell-Kulesza, G. G.	Dec 47
Cross, D. E.	Apr 69
Crowson, R.	Jan 64
Davis, R. C.	Dec 52
Field, L. V.	Mar 41
Fischmann, G. S.	Aug 41
Fisher, H. W.	Apr 68
Flickinger, J. K.	Jan 63
Fogg, S. G.	May 42
Fortenberry, E. D.	Sept 60
Fowler, L.	Sept 46
Frost, D. R.	Apr 40
Galbreath, J. M.	Oct 101
Gardner, R. R.	Aug 62
Grant, J. F.	Nov. 53
Guttensohn, A. E.	Feb 63
Haalman, A.	Aug 55
Hatch, Jr., R. W.	Jan 39
Hegner, H. R.	Oct 85
Hehn, A. H.	Oct 85
Henderson, E. H.	Aug 50
Hill, H. N.	Mar 33
Hougen, J. O.	Aug 45, Oct 81
Houser, E. A.	May 51
Huff, W. P.	Feb 47
Humphrey, D. W.	July 56
Ida, E. S.	Jan 46
Jackson, R. C.	Nov 43
Jaffurs, M. C.	May-55
Johnson, J. A.	Dec 54
Kaminski, R. K.	July 32, Sept. 41, Nov 63
Keyt, D. E.	Feb 62
Kinner, H. D.	Jan 39
Kotnick, G.	Sept 52
Lloyd, S. G.	Feb 58
Lue, D.	June 62
Lumb, A. C.	Apr 56
Luyben, W. L.	Apr 61
Lynnworth, L. C.	Apr 47
Magison, E. C.	Feb 41
Maness, E. L.	Sept 56

Authors	Issue, Page
Marsch, J. E.	Feb 54
Marzetta, L. A.	Feb 51
Mataich, P. F.	Feb 47
McCleskey, G. H.	July 46
Meyers, S. S.	Dec 66
Mixon, J. D.	Sept 59
Moore, R. L.	Mar 52
Mott, W. E.	July 52
Noel, Y.	June 43
Ostfeld, D. M.	Sept 32
Peterson, J. D.	July 56
Pirlet, R.	June 43
Purser, W. F. C.	Jan 51
Rhodes, D. F.	July 52
Roof, L. B.	Sept 60
Ryan, W. J.	Nov 57
Sauer, Jr., H. J.	Mar 41
Scheck, H. F.	Sept 52
Schooley, A. T.	Jan 57
Schuler, A. E.	Dec 41
Scoppe, F. E.	Oct 95
Slavin, J.	Nov 48
Smith, P. D.	Mar 41
Stout, T. M.	June 56
Stutheit, J. S.	June 52
Sundt, D. C.	Nov 39
Talbot, F. D. F.	June 48
Talbot, J. E.	Oct 66
Togneri, M. G.	May 37
Tye, R. P.	Mar 45
Union, D. C.	May 46
Vallereal, T.	Feb 63
Wank, M. R.	Jan 43
Witte, A. G.	Feb 54
Woo, R.	July 41
Zoss, L. M.	Feb 54

INSTRUMENT ENGINEER

Join Badger's Tampa Operations

Badger, one of the foremost engineering contractors in the chemical and petrochemical fields, has an immediate need for an Instrument Engineer with three or more years' experience in the selection, application, and specification of pneumatic electronic controls to be used in the design and construction of petroleum, petrochemical and chemical process plants.

The qualified engineer will plan, conduct and coordinate highly specialized assignments involving the entire instrumentation for a wide variety of new construction projects concerned with petroleum refineries, petrochemical and chemical process plants. You will be responsible for originating the conceptual instruments according to data obtained from process design flow sheets. You will also be responsible for determining the right specifications for the selection of suitable instruments. You will also maintain a liaison with other engineering and construction sections of the company as well as with instrument and equipment suppliers. You will generally operate with appreciable latitude for unreviewed action or decision. You will report to the Project Manager. The qualified engineer should have a BSME, BSChE, possibly a BSEE, or equivalent experience.

Badger offers excellent salaries and liberal fringe benefits. Send your resume in confidence to Mr. R. W. Kilgore, P.O. Box 1433, Tampa, Florida 33602.

BADGER

SUBSIDIARY OF RAYTHEON COMPANY

An Equal Opportunity Employer

Subjects

Subjects	Issue, Page
Absorptometers	June 52
Acoustics	Apr 47, Dec 66
Adaptive control	Jan 57
Aerospace	July 32, Oct 85
Amplifiers	Feb 51, Apr 67, June 67
Analog control	Jan 46, Feb 54
Analyzers	
gas chromatography	Apr 56, Sept 46 Sept 56, Nov 57
others	Mar 33, June 52, July 52 Sept 41, Sept 52, Nov 64
Batching	Jan 57, May 37, Aug 45
Biomedical instruments	Aug 41
Block diagrams	Oct 81
Bridges	Aug 63
Calibration	June 67, Nov 43, Nov 64, Dec 47
Compressor	June 62
Computers	
analog	Jan 57, Nov 53
digital	Jan 51, Feb 47, Apr 56, May 46, June 56 July 46, Aug 55, Oct 75, Nov 57, Dec 54
Computer programming	Jan 51, Apr 40, Aug 55 Sept 32, Nov 57
Consoles	May 46
Controllers	Feb 54, Oct 66
Converters	Jan 63
Counters	Mar 57, Dec 66
Data acquisition	Feb 51, June 67, July 32 Aug 50, Nov 57
Density	July 52
Design	Jan 46, Feb 41, Feb 54, Apr 61 June 48, Aug 45, Sept 56, Oct 81
Dewpoint	Oct 101, Dec 66
Differential pressure	Jan 63
Digital instruments	Aug 50, Dec 41
Displacement	June 43
Display	May 37, May 46, July 32
Distillation	June 48, Aug 45, Sept 56, Oct 75
Economics	June 56, Aug 62
Education, training	Feb 62, May 55, Nov 53
Emissivity	Jan 43
Feedforward control	Jan 57, Apr 67, June 48
Flow	Mar 41, Apr 53, Apr 68
Fluidics	Jan 39, June 62
ISA Conference, exhibit	Dec 60
Infrared	Jan 43
Interrupts	Jan 51
Ion-selective electrodes	Sept 41
Lasers	June 43, Nov 64
Level	Jan 64, Oct 100
Logic	May 37, Dec 54
Magnetostriction	Oct 95
Maintenance	May 42, July 56, Aug 50, Dec 47
Management	May 42, Dec 47
Marketing	Jan 8, June 10, Aug 41
Monitors, alarms	Jan 63, July 46, Oct 85, Dec 52
Noise	Feb 51
Nuclear instrumentation	June 52, July 42
Optimization	Aug 55, Oct 75
Override controls	July 56
Pneumatic process instrumentation	Jan 46, Feb 58 Mar 52, Apr 61
Pollution	Mar 33, Sept 52
Power industry	July 41, Nov 53, Dec 54
Pressure	Jan 64
Programmers	Jan 39
Ratio control	Jan 46
Regulators	Mar 52
Reliability	Oct 85
Safety, protection	Jan 46, Jan 63, Feb 41 Feb 63, Nov 48
Sampling	May 51, Sept 46, Sept 59, Sept 60
Sequencing	Jan 39, May 37, June 62, July 56, Dec 54
Setpoint control	Feb 47, Aug 55
Signal conditioning	Feb 51, June 67
Simulation	Jan 57, Nov 53, Dec 54
Standards	Feb 41, Sept 32
Steel industry	June 43, July 46
Strain gages	Aug 63
Switching	May 51, Aug 63, Oct 101, Nov 57
TV monitors, crt's	Jan 63, June 43
Telemetering	July 32
Temperature	
control	June 68
measurement	Jan 43, Mar 45, Mar 57 Apr 47, Nov 43, Nov 63
Testing	Feb 63, July 41, Aug 45 Aug 50, Oct 85, Dec 47
Theory	Feb 54, Feb 58, Mar 41, Mar 52 Apr 61, Oct 75, Oct 81
Thermal conductivity	Mar 45
Thermocouples	Mar 57, Nov 43, Nov 63
Thickness	June 43
Timing	Jan 51, May 37, June 68
Torque	Oct 95
Tubing	Apr 61, Aug 62
Tuning	Feb 54
Ultrasonics	Apr 47
Valves, control	Feb 58, Oct 92
Vibration	Oct 85, Nov 39